

**WHAT IS CLAIMED IS:**

1. A method of insulating a tank, such as a water heater storage tank, comprising the steps of:

5 placing an outer jacket on the tank to define a cavity extending outwardly around a portion of the tank;

positioning a flexible bag in a first portion of said cavity, said bag having a spaced series of metering openings in a wall portion thereof;

10 forcing a first quantity of flowable, hardenable insulation into said bag in a manner expanding said bag into sealing engagement with said tank and said outer jacket, and causing a small portion of said insulation to be forced outwardly through said metering openings and subsequently form spaced apart hardened external protrusions on said bag;

15 flowing a second quantity of flowable, hardenable insulation into a second portion of said cavity and into contact with said wall portion of said bag and the hardened protrusions thereon; and

20 permitting said second quantity of insulation to harden and become mechanically interlocked with the previously hardened insulation protrusions in a manner substantially preventing shrinkage-created separation of said second insulation quantity from said wall portion of said bag.

2. The method of Claim 1 wherein:

25 said forcing and flowing steps are performed using a liquid foam insulation material.

3. The method of Claim 1 wherein:

said positioning step is performed using a plastic bag.

4. The method of Claim 1 wherein:

said forcing step is performed in a manner providing said protrusions with surface areas spaced apart from and generally facing said wall portion of said bag.

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5. The method of Claim 1 wherein:

said flexible bag has a substantially closed upper end portion with a relatively small injection opening and associated vent opening area therein; and

10       said forcing step is performed by injecting a liquid foam insulation material through said injection opening in a manner causing the injected foam insulation material to be packed under pressure within said bag and thus enhance the top-to-bottom insulation density uniformity in the bag subsequent to said forcing step.

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6. The method of Claim 5 wherein:

said bag has an upper edge, and

      said method further comprises the step of disposing said vent opening area adjacent said upper edge.

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7. The method of Claim 6 wherein:

      said disposing step is performed by forming in a wall portion of said bag a spaced series of vent holes inwardly adjacent and generally parallel to said upper edge.

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8. The method of Claim 6 wherein:

said bag has corner portions at opposite ends of said upper edge,  
and

said disposing step is performed by extending vent openings

5 through said corner portions.

9. The method of Claim 1 wherein:

said bag has an upper end extending between opposite vertical side  
edge portions, and

10 said method further comprises the step of arranging said metering  
openings in vertically spaced series along said vertical side edge portions.

10. The method of Claim 9 further comprising the step of:

configuring said metering openings to have cross-sectional areas

15 which increase upwardly along the lengths of said vertical side edge  
portions.

11. The method of Claim 9 wherein:

said opposite side edge portions include opposite front and rear  
20 side wall portions of said bag, and

said arranging step includes the step of extending said metering  
openings through said opposite front and rear side wall portions of said  
bag.

12. The method of Claim 9 wherein:
- said vertical side edge portions of said bag include pleated areas of  
    said bag, and
- 5      said arranging step includes the step of extending said metering  
    openings through said pleated areas.

13. Insulated tank apparatus comprising: /  
a tank;  
a jacket extending outwardly around said tank and defining a cavity  
between said jacket and said tank;  
5 a flexible bag disposed in a first portion of said cavity in sealing  
engagement with facing portions of said tank and said jacket, said bag  
having wall openings therein that face a second portion of said cavity;  
a first quantity of hardened insulation material disposed in said bag,  
a small portion of said hardened insulation material projecting outwardly  
10 through said wall openings defining spaced apart locking protrusions on  
the external surface of said bag; and  
a second quantity of hardened insulation material placed in a second  
portion of said cavity after the hardening of said first insulation quantity  
and mechanically interlocked with said locking protrusions.
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14. The insulated tank apparatus of Claim 14 wherein:  
said locking protrusions are generally knob-shaped and have surface  
portions spaced apart from and generally facing said bag, and  
said second quantity of hardened insulation material abuts said  
20 surface portions.
16. The insulated tank apparatus of Claim 13 wherein:  
said tank is a water heater storage tank.
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16. The insulated tank apparatus of Claim 13 wherein:  
said first and second quantities of hardened insulation material are  
hardened liquid foam insulation material.

17. The insulated tank apparatus of Claim 13 wherein:  
said bag is of a plastic material.
18. The insulated tank apparatus of Claim 13 wherein:  
5 said bag has a substantially closed upper end portion with a  
relatively small insulation injection opening therein.
19. The insulated tank apparatus of Claim 18 wherein:  
said bag further has at least one vent opening adjacent said injection  
10 opening.
20. The insulated tank apparatus of Claim 18 wherein:  
said bag has an upper end edge through which said insulation  
injection opening extends, and further has a plurality of vent openings  
15 downwardly adjacent and spaced apart in a direction parallel to said upper  
end edge.
21. The insulated tank apparatus of Claim 18 wherein:  
said bag has opposite upper corner edge portions through which  
20 vent openings extend.
22. The insulated tank apparatus of Claim 13 wherein:  
said bag has an upper end extending between opposite vertical side  
edge portions, and  
25 said wall openings are arranged in vertically spaced series along said  
vertical side edge portions.

23. The insulated tank apparatus of Claim 22 wherein:  
said wall openings have cross-sectional areas which increase  
upwardly along the lengths of said vertical side edge portions.

5        24. The insulated tank apparatus of Claim 22 wherein:  
said opposite side edge portions include opposite front and rear  
side wall portions of said bag, and  
said wall openings extend through said opposite front and rear side  
wall portions of said bag.

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25. The insulated tank apparatus of Claim 22 wherein:  
said vertical side edge portions of said bag include pleated areas of  
said bag, and  
said wall openings extend through said pleated areas.

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26. A water heater comprising:
- a tank adapted to hold a quantity of water and having a vertically extending side wall portion;
  - heating apparatus for heating water disposed in said tank;
  - 5 a jacket extending outwardly around said side wall portion and defining a cavity between said jacket and said tank, said jacket having an opening therein;
  - a water heater component extending outwardly from said tank toward said access opening;
  - 10 a foam dam disposed within a first portion of said cavity and sealingly circumscribing said component, said foam dam including:
    - an apertured flexible bag in expanded, sealing engagement with facing portions of said tank and said jacket circumscribing said component, said bag having wall openings therein that face a second portion of said cavity, and
    - 15 a first quantity of hardened liquid foam insulation material disposed in said bag, a small portion of said hardened insulation material projecting outwardly through said wall openings and defining spaced apart locking protrusions on the external surface of said bag; and
  - 20 a second quantity of hardened liquid foam insulation material placed in a second portion of said cavity after the hardening of said first insulation quantity and mechanically interlocked with said locking protrusions.
- 25 27. The water heater of Claim 26 wherein:
- said water heater is an electric water heater.

28. The water heater of Claim 27 wherein:

5 said heating apparatus includes an electric resistance heating element extending inwardly from said water heater component into said tank.

29. The water heater of Claim 28 wherein:

10 said water heater component is a thermostatic control component.

30. The water heater of Claim 26 wherein:

15 the density of said first quantity of hardened liquid foam insulation in said bag is substantially uniform along the vertical dimension of said bag.

31. The water heater of Claim 26 wherein:

20 said bag has opposite vertical side edge portions, and  
said wall openings are vertically spaced apart along said side edge portions.

32. The water heater of Claim 31 wherein:

25 the cross-sectional areas of said wall openings increase upwardly along the lengths of said vertical side edge portions.

33. The water heater of Claim 26 wherein:

25 said bag has opposite pleated vertical side edge portions.

34. The water heater of Claim 26 wherein:

30 said bag has a substantially closed upper end portion through which a relatively small insulation injection opening extends.

35. The water heater of Claim 34 wherein:

said bag further has at least one vent opening adjacent said insulation injection opening.

5 36. The water heater of Claim 26 wherein:

said locking protrusions are generally knob-shaped and have surface portions spaced apart from and generally facing said bag, said surface portions abutting surface portions of said second quantity of hardened liquid foam insulation.

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37. The water heater of Claim 26 wherein:

said water heater component extends through an aperture in said bag having, prior to expansion of said bag by the insulation therein, has generally concave opposite sides which are materially straightened when  
15 said bag is brought into said expanded sealing engagement with facing portions of said tank and said jacket.

38. A method of insulating a tank, such as a water heater storage tank, comprising the steps of:

    placing an outer jacket on the tank to define a cavity extending outwardly around a portion of the tank;

5      positioning a flexible bag in a first portion of said cavity, said flexible bag having a substantially closed upper end portion with a relatively small injection opening and associated vent opening area therein;

    forcing a first quantity of flowable, hardenable insulation into said bag through said injection opening in a manner expanding said bag into

10     sealing engagement with said tank and said outer jacket and causing said first quantity of insulation to be packed under pressure within said bag and thus enhance the top-to-bottom insulation density uniformity in said bag subsequent to said forcing step; and

15     flowing a second quantity of flowable, hardenable insulation into a second portion of said cavity and into contact with said bag.

39. The method of Claim 38 wherein:

    said forcing and flowing steps are performed using a liquid foam insulation material.

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40. The method of Claim 38 wherein:

    said positioning step is performed using a plastic bag.

41. The method of Claim 38 wherein:

25     said bag has an upper edge, and

    said method further comprises the step of disposing said vent opening area adjacent said upper edge.

42. The method of Claim 41 wherein:

said disposing step is performed by forming in a wall portion of said bag a spaced series of vent holes inwardly adjacent and generally parallel to said upper edge.

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43. The method of Claim 41 wherein:

said bag has corner portions at opposite ends of said upper edge, and

10       said disposing step is performed by extending vent openings through said corner portions.